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Wetland Creation/Restoration Alternative Measures

The following measures have been identified as addressing the ideas and concerns of those involved in the Wetland Creation/Restoration Plan Formulation meetings on 1 December 2000 and 6 February 2001. These measures incorporate all comments received through the coping process which are consistent with the scope of the study. These measures will be used to formulate alternative plans for analysis. Please note that whereas some of the measures are mutually exclusive, others can interact (either positively or negatively), and others will have no interaction. A brief description of the rationale and desired results are included.

Chenier Unit

- **Buy Land/Obtain Conservation Easement.** This unit contains some of the last remaining maritime forest habitat in Louisiana. It is listed as an imperiled to critically imperiled habitat. In areas where land owners are seeking to commercially develop the land (e.g., sand mining or residential development), an option to acquire control of the land should be considered. This would place the land under state control, preventing unwanted development. It would also prevent land rights issues from hampering future conservation efforts. Lands obtained could be designated as a state park, which could lead to educational/recreational opportunities (e.g., bird watching areas, and a boardwalk through maritime forest habitat).
- **Ridge Restoration.** The chenier ridges support the last remaining maritime forest in the Mississippi River delta plain, which has been identified by the Louisiana Natural Heritage Program as imperiled to critically imperiled habitat. Additionally, hundreds of thousands of migratory neotropical birds use maritime forests as vital resting and foraging habitat on their trans-gulf migration. The expansion of the maritime forest habitat would provide ecological benefits, as well as opportunities for education and recreation (e.g., bird watching areas, and a boardwalk through maritime forest habitat). Material could be obtained from offshore or the degradation of the impoundment levee. The creation of additional ridge habitat will require pairing with marsh creation to offset any habitat conversions (e.g., marsh vegetation to higher wooded vegetation). Ridge restoration could include rebuilding subsided ridges, replanting with woody species, and creating marsh between the ridges, or creating marsh between the ridges to protect existing ridge features (lower priority).
- **Marsh Creation.** This measure uses fill material brought in from off-site. The type of fill method used will depend on the characteristics of the placement area. There are two main categories of placement areas: open water with little or no existing marsh remaining, and broken marsh with few spoil banks.
 - Open water – In areas of open water with little or no existing marsh, more traditional marsh creation techniques could be used. Existing features such as spoil banks and natural ridges would be used as containment levees to the extent

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- possible, and additional containment levees would be constructed to retain dredged material. After dewatering and planting, the retaining levees and spoil banks would be breached to restore hydrologic connectivity. Care would be used to ensure that adequate interspersions are created to balance productivity with longevity. Additionally, in areas of open water adjacent to areas of broken marsh, excess flow could be routed into the broken marsh to nourish it during the filling of the open areas. This would provide additional benefits at minimal extra cost.
- **Broken Marsh** – In areas of broken marsh, traditional fill methods could kill existing marsh plants. Techniques have been tested (e.g., spray dredge) to add sediment to a broken marsh to raise the bottom elevation to marsh level without killing existing marsh plants. By increasing the ratio of water to sediment in the pumped material, the slurry would flow among and around the existing vegetation without covering it over. These techniques could increase the acreage of marsh without the initial sacrifice of existing acreage. It also has the added benefit of providing a readily available source for revegetation (i.e., existing marsh plants), so little or no manual planting would be necessary. This method is also more conducive to naturally creating interspersions in the form of marsh ponds and tidal channels than traditional fill methods.
 - **Create Wooded Habitat.** Existing features with higher elevations (e.g., spoil banks) could be used as a structural framework for the creation of wooded habitat, preferably maritime forests. Because maritime forest habitat is imperiled, efforts should be made to increase this habitat, which is critical for the migratory patterns of neotropical migratory birds. The wooded areas would also provide a potential nesting area (rookery) for wading birds such as roseate spoonbill, egret species, and heron species. By using existing features as a core, the impact to marshes can be minimized, while simultaneously allowing the creation of a larger patch of wooded habitat. The higher area could also serve to stabilize existing or created adjacent marshes. The feature would be constructed primarily from material obtained from adjacent spoil banks as they are breached for hydrologic restoration. The quality of this material would be well suited for the creation of higher elevations. Additionally, an elevation gradient would be created, with a vegetation gradient from high woody species, to low woody shrubs, to marsh vegetation. This would provide an ecological link from the upland habitat to the marshes and open water.
 - **Fill LOOP Pipeline Canal.** The LOOP pipeline canal acts as a direct conduit for tidal flow into areas that historically had much slower tidal currents. Filling the pipeline canal would restore the hydrology to more natural conditions, and create marsh in the process. The adjacent landowners are very supportive of this alternative. The canal was supposed to be filled after construction, but only the original material was returned to the canal, which proved to be inadequate. An option is to plug the canal (if it is too deep to fill) to restore the hydrology.
 - **Educational/Recreational Area Next to Hwy 1.** Because of the proximity of LA Highway 1, the opportunity exists to create an area that could be used for bird watching and/or fishing. This could consist of a parking area with access to a pier or

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boardwalk to view birds, and maybe provide a place to fish. Preference should be given to placing the facility near maritime forest habitat (either natural or created) to maximize the educational opportunity. The location on the map is a suggestion, but the actual location can be modified based on a balance of real estate issues and access to target habitats.

- **Degrade Impoundment Levee.** The mariculture impoundment levee hydrologically isolated the northern area from the southern area, and has led to increased land loss in the impounded area. There are some breaches in the levee, but additional degradation of the impoundment levee is anticipated to restore a more natural hydrology to the impounded area, allowing natural sediment introduction, and reducing the land loss rate. Material from the levee could be used to fill some of the borrow pits used for its construction, for ridge restoration, or the creation of additional wooded habitat.
- **Terrace Open Areas.** The sediments in this area are particularly suited for this method (firm, with a high sand content). This would involve digging material from adjacent water bottoms, and would be considered in areas where sediment characteristics and energy climates would support these structures. These terraces would create some marsh, but mainly would protect existing marsh by reducing fetch and wave energy to prevent the erosion of existing habitat. They would also help to trap the limited sediment supply in the area.

Caminada Unit

- **Shoreline Protection.** This alternative calls for shoreline stabilization of Lake Laurier, Lake Palourde, and Bay Macoin, to protect LA Highway 1 and the integrity of the land bridges in this unit. Land bridge protection will prevent the loss of inland marshes as well. Shoreline protection can take many forms, including shoreline armoring, wave absorbers, or breakwaters.
 - One option would be to armor the shoreline with oyster shells, if an adequate supply can be obtained, or material that would provide suitable culch for the establishment of oyster colonies, such as crushed aggregate or riprap.
 - Another option for open water areas is creating offshore wave absorbers. This could involve either digging material from adjacent water bottoms, importing sediment from alternative sites, or shipping in recycled material, such as oyster shells, to create a reef. Wave absorbers would not create marsh habitat, but would protect existing habitats. In Bay Macoin segmented breakwaters may be the most viable option because of the high energy regime.
- **Marsh Creation.** This measure uses fill material brought in from off-site. It can also address land-bridge restoration, which would not only create marsh, but also protect existing marshes further inland from tidal scour and saltwater intrusion. The major land bridges include between Lake Laurier and Lake Palourde, between Bay Macoin and lakes Palourde and Laurier, and between Bay Macoin and Caminada Bay (lowest

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priority). The type of fill method used will depend on the characteristics of the placement area. There are two main categories of placement areas: open water with little or no existing marsh remaining, and broken marsh with few spoil banks.

- **Open water** – In areas of open water with little or no existing marsh, more traditional marsh creation techniques could be used. Existing features such as spoil banks and natural ridges would be used as containment levees to the extent possible, and additional containment levees would be constructed to retain dredged material. After dewatering and planting, the retaining levees and spoil banks would be breached to restore hydrologic connectivity. Care would be used to ensure that adequate interspersions are created to balance productivity with longevity. Additionally, in areas of open water adjacent to areas of broken marsh, excess flow could be routed into the broken marsh to nourish it during the filling of the open areas. This would provide additional benefits at minimal extra cost.
- **Broken Marsh** – In areas of broken marsh, traditional fill methods could kill existing marsh plants. Techniques have been tested (e.g., spray dredge) to add sediment to a broken marsh to raise the bottom elevation to marsh level without killing existing marsh plants. By increasing the ratio of water to sediment in the pumped material, the slurry would flow among and around the existing vegetation without covering it over. These techniques could increase the acreage of marsh without the initial sacrifice of existing acreage. It also has the added benefit of providing a readily available source for revegetation (i.e., existing marsh plants), so little or no manual planting would be necessary. This method is also more conducive to naturally creating interspersions in the form of marsh ponds and tidal channels than traditional fill methods.

Leeville Unit

- **Marsh Creation.** This measure uses fill material brought in from off-site. The type of fill method used will depend on the characteristics of the placement area. There are two main categories of placement areas: open water mostly surrounded by spoil banks, and broken marsh with few spoil banks.
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- **Enhance Wooded Habitat.** Existing features with higher elevations (e.g., spoil banks) could be used as a structural framework for the creation of wooded habitat, preferably maritime forests. Because maritime forest habitat is imperiled, efforts should be made to increase this habitat, which is critical for the migratory patterns of neotropical migratory birds. The wooded areas would also provide a potential nesting area (rookery) for wading birds such as roseate spoonbill, egret species, and heron species. Material could be obtained from the breaching of existing spoil banks and retention dikes after marsh creation. The higher area could also serve to stabilize existing or created adjacent marshes. Many of the existing spoil bank islands in this area have steep edges. A gradation in elevation would be created, with a vegetation gradient from high woody species, to low woody shrubs, to marsh vegetation. This would provide an ecological link from the upland habitat to the marshes and open water. Additionally, the proximity of the area to Highway 1 and Leesville could allow these islands to act as an educational opportunity, and also spur ecotourism.
- **Isolate Marshes from SW Louisiana Canal.** The Southwest Louisiana Canal is an avenue for tidal scour and saltwater intrusion that is much more direct than was historically present in this area. By isolating the marsh complex to the south of the canal from the waterway, a fresher regime may be able to be maintained. This could also reduce currents in the area and reduce salt pulses associated with the canal.

Bayou L'Ours South Unit

- **Marsh Creation.** This measure uses fill material brought in from off-site. The type of fill method used will depend on the characteristics of the placement area. Additionally, existing features with higher elevations (e.g., spoil banks) could be used as a structural framework for the creation of wooded habitat, which would provide perching bird habitat, and a potential nesting area (rookery) for wading birds such as roseate spoonbill, egret species, and heron species. Material could be obtained from the breaching of existing spoil banks and retention dikes after marsh creation. There are two main categories of placement areas: open water mostly surrounded by spoil banks, and broken marsh with few spoil banks.
 - **Open water** – In areas of open water with little or no existing marsh, more traditional marsh creation techniques could be used. Existing features such as

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 - **Plug Canals.** The landowner has mentioned saltwater intrusion as the primary cause of marsh loss in this unit. By placing plugs in strategic locations, and rebuilding some of the degraded spoil banks, this area could be more isolated from the influences of saltwater intrusion. The landowner has suggested that, at least on canals that will still require access, an earthen plug be used to close it off. When access is needed, they could easily remove and replace the plug. Such an arrangement would prevent the need for a hard structure such as a floodgate, and be much less expensive.

Bayou L'Ours North Unit

- **Shoreline Protection.** The marshes along the southern shore of Little Lake are breaking up. Wave absorbers would help protect the shoreline from erosion. This could involve either digging material from adjacent water bottoms to fill geotubes, or importing the sediment from alternative borrow sites. Wave absorbers would not create marsh habitat, but would protect existing habitats.
- **Marsh Creation.** This measure uses fill material brought in from off-site. The type of fill method used will depend on the characteristics of the placement area. There are two main categories of placement areas: open water with little or no existing marsh remaining, and broken marsh with few spoil banks.
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